

Chapter III

THE NATURAL RESOURCE BASE

INTRODUCTION

The natural resource base of Waukesha County is one of the most important factors influencing the development potential of the County. It is the natural resource base which makes the County an attractive location for residential, commercial, and industrial development. The natural resource base has great economic as well as recreational and aesthetic value. In order to preserve and protect this important asset, future urban development in Waukesha County must be carefully adjusted to the ability of the natural resource base to support various forms of urban and rural development without deterioration or destruction of that underlying and sustaining base.

Protection of the natural resource base is also essential to the maintenance of biological diversity. This term refers to the relative abundance of each of a broad cross-section of different types of ecosystems, organisms, and the genetic composition that exist in any particular region. All species exist and evolve in an ecological context that is in response to changes in their environment. The raw material for evolution is genetic variability, which enables species to adapt and change. Through time, a large amount of genetic diversity has accumulated in the Region's plant and animal species so that differences exist between individuals and populations of the same species. The greater the genetic diversity, the more likely that at least some individuals can cope with environmental stress. This is essential for the long-term viability of species, particularly in urbanizing environments such as Waukesha County. Maintenance of a high level of biological diversity which in turn helps to provide for genetic variability is greatly facilitated through preservation of the natural resource base which accommodates a range of environmental conditions to assure species survival.

The natural resource base is susceptible to irreversible damage through inappropriate land use, transportation, and public facility development, especially in Waukesha County, where a considerable proportion of the population resides in close proximity to environmentally sensitive inland lakes

and waterways. Without sufficient understanding and recognition of the character and importance of the various elements of the natural resource base, human use and alteration of the natural environment proceeds at the risk of excessive costs in terms of both monetary expenditures and environmental degradation. A sound and meaningful County planning effort must therefore acknowledge that natural resources are limited, and that urban development should be properly adjusted to the natural resource base so that serious and costly environmental problems can be avoided.

This chapter presents an inventory and analysis of the natural resource base of Waukesha County. Included is descriptive information pertaining to climate, air quality, physiography, bedrock geology, topography, soils, groundwater resources, surface-water resources, wetlands, woodlands, prairies, and wildlife habitat. This chapter also presents information concerning natural resource base related elements, including major park and open space sites, historic sites, and natural area sites. The chapter concludes with a discussion of environmental corridors within the County.

CLIMATE

Its midcontinental location gives Waukesha County a continental climate which spans four seasons, one season succeeding the other through varying time periods of unsteady transition. Summers, generally the months of June, July, and August, are relatively warm, with occasional periods of hot, humid weather and sporadic periods of cool weather. The cold winter, accentuated by prevailing frigid northwesterly winds, generally spans the months of December, January, and February, but may in some years include parts of November and March. Autumn and spring in the County are transitional times of the year between the dominant seasons and usually periods of widely varying weather conditions. Temperatures are extremely varied, and long periods of precipitation are common in autumn and spring. Some of the more pronounced weather events include tornadoes and major snowmelt occurrences.

Table 29

**TEMPERATURE CHARACTERISTICS
AT THE CITY OF WAUKESHA: 1940-1987**

Month	Average Daily Minimum	Average Daily Maximum	Mean
January	10.7	26.6	18.7
February	15.2	31.1	23.2
March	23.5	40.6	32.1
April	35.2	55.9	45.6
May	45.4	67.5	56.5
June	55.2	78.1	66.7
July	60.5	83.1	71.8
August	59.3	80.8	70.1
September	51.3	73.0	62.2
October	40.8	62.2	51.5
November	29.0	45.0	37.0
December	17.2	32.1	24.7
Yearly Average	36.9	56.3	46.6

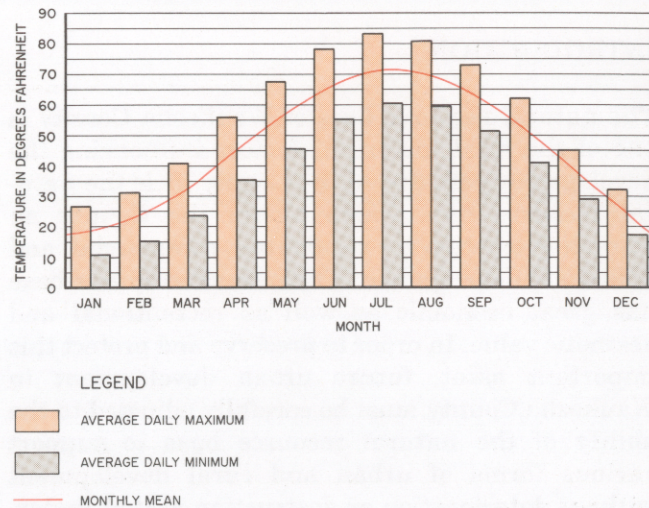
NOTE: The monthly average daily maximum temperature and the monthly average daily minimum temperature are obtained by using daily measurements to compute an average for each month in the period of record. The results are then averaged for all the months in the period of record. The monthly mean temperature is the mean of the average daily maximum temperature and the average daily minimum temperature.

Source: National Climatic Data Center, Wisconsin Statistical Reporting Service, and SEWRPC.

Air temperatures within the County are subject to extreme seasonal variation. Data on temperature observations in the County, recorded at the City of Waukesha and shown in Table 29, indicate the variations in temperature which may be expected to occur in the County. The temperature data, illustrated in Figure 29, also indicate that air temperatures in the County lag approximately one month behind the summer and winter solstices, with the result that July is the warmest month and January is the coldest. The growing season, which is defined as the number of days between the last freeze in the spring and the first freeze in the fall, averages about 155 days in Waukesha County. The last freeze in the spring normally occurs during the first two weeks in May and the first freeze in the fall normally occurs in mid-October.

Figure 29

**TEMPERATURE CHARACTERISTICS
AT THE CITY OF WAUKESHA: 1940-1987**



Source: National Climatic Data Center, Wisconsin Statistical Reporting Service, and SEWRPC.

Precipitation in Waukesha County, in the form of rain, sleet, hail, and snow, ranges from gentle showers to destructive thunderstorms. The more pronounced weather events can cause major property and crop damage, inundation of poorly drained areas, and lake and stream flooding. Daily precipitation data for observations recorded at the City of Waukesha are shown in Table 30 and illustrated in Figure 30. These data encompass periods of record from 1940 through 1988 for total precipitation and from 1930 through 1988 for snowfall. The total average annual precipitation observed is slightly more than 32 inches, expressed as water equivalent. Monthly averages range from a low of 1.16 inches in February to a high of 3.70 inches in June. Snowfall and sleet averages approximately 41 inches annually, with January receiving the most snow and sleet, 11.3 inches.

Waukesha County is positioned astride cyclonic storm tracks along which low-pressure centers move from the west and southwest. The County also lies in the path of high-pressure centers moving in a generally southeasterly direction. This location at the confluence of major migratory air masses results in the County being influenced by a continuously changing pattern of air masses associated with alternately high- and low-pressure centers and

Table 30

**PRECIPITATION CHARACTERISTICS
AT THE CITY OF WAUKESHA: 1940-1987**

Month	Average Total Precipitation ^a	Average Snow and Sleet ^b
January	1.5	11.3
February	1.2	7.1
March	2.4	9.6
April	3.1	1.6
May	3.3	0.2
June	3.7	0.0
July	3.5	0.0
August	3.6	0.0
September	3.3	0.0
October	2.3	0.0
November	2.3	2.9
December	1.8	8.6
Yearly Average	32.0	41.3

^aData based on the period 1940 to 1987.

^bData based on the period 1930 to 1987.

Source: National Climatic Data Center, Wisconsin Statistical Reporting Service, and SEWRPC.

results in frequent weather changes superimposed on the aforementioned annual range in weather characteristics, especially in winter and spring.

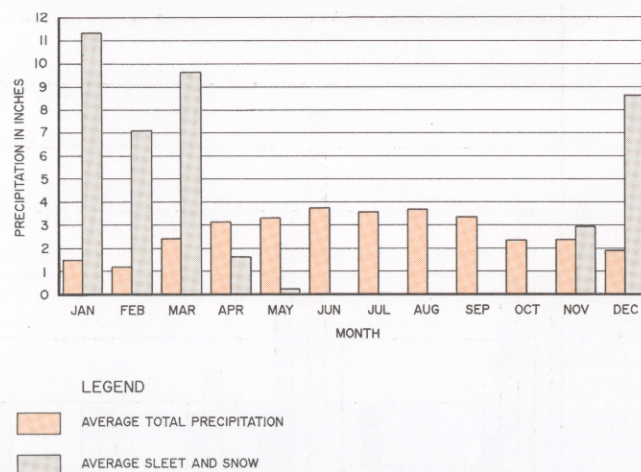
Prevailing winds in the County are northwesterly in the late fall and winter, northeasterly in the spring, and southwesterly in the summer and early fall. Wind velocities are less than five miles per hour (mph) for about 15 percent of the year, between five and 15 mph for about 60 percent of the year, and more than 15 mph for about 25 percent of the year.

AIR QUALITY

Air quality is an important determinant of the quality of life in Waukesha County and has important direct and indirect effects on the local economy. Air generally contains substances in the form of smoke, soot, dust, fly ash, fumes, mists, odors, and pollens. Although some of these pollutants in air have natural sources, much is contributed by such man-made sources as land cultivation, heat and power generation, industrial processes, transportation movements, and waste burning. Urbanization tends to intensify the con-

Figure 30

**PRECIPITATION CHARACTERISTICS
AT THE CITY OF WAUKESHA: 1940-1987**



Source: National Climatic Data Center, Wisconsin Statistical Reporting Service, and SEWRPC.

tribution of air pollutants from human activities because the distribution of pollutant sources is less dispersed and, rather, more concentrated. When the level of pollutants in the air becomes so severe as to seriously and adversely affect health and property, an air quality problem exists.

The U. S. Environmental Protection Agency (EPA) has established ambient air quality standards to be promulgated nationally. Primary standards are intended to protect human health, while secondary standards are aimed at protecting the public welfare by preventing damage to vegetation and real and personal property and at improving visibility. These standards, revised in the Clean Air Act Amendments of 1990, have been set for pollutants including particulate matter, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone, and lead. On the basis of these standards, nonattainment areas, areas with ambient air quality conditions which do not meet the prescribed standards, have been identified. As a result, the Southeastern Wisconsin Region, and consequently all of Waukesha County, has been designated as an ozone nonattainment area. In addition, a portion of the City of Waukesha has been designated as a secondary nonattainment area for particulate matter.

Ozone

Ozone is referred to as a photochemical oxidant, a substance that, when subjected to certain conditions of heat and light, reacts chemically with other